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Relation between tested intelligence and length of institutionalization in children

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RELATION BETWEEN TESTED INTELLIGENCE AND LENGTH OF INSTITUTIONALIZATION IN CHILDREN

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Relation Between Tested Intelligence And Length of Institutionalization In Children

The purpose of the present study was to examine the relationship between the tested intelligence of children in a public children's shelter and the length of time these children had been institutionalized.

Since the late 1940s, when widespread concern about the effect of institutional care on infants and children first resulted in systematic research of the subject, many studies in the field have been published. Most have dealt with the detrimental effects on emotional and social development of the institutionalized child, an issue outside the area of the present study. About a dozen studies have reported effects of institutionalization on intelligence. A review of the literature relating the effects of institutionalization or deprivation on learning or intelligence, in human beings and in lower animals, follows.

Studies of Human Beings

Inquiry about the effect of institutionalization on the development

of children was first systematically focused near the end of World War II. Spitz (1948, 1955) wrote principally about the emotional effects on the individual of early loss of mothering. However, in an extensive study of infants in various home and institutional settings, he made note of intellectual functioning. Of 366 subjects (302 in various institutions; 64 in homes) his study showed a lowering of "quotient of development" (he does not describe in the article his means of determining this quotient) with maternal separation. The lowering of score ranged from 12 1/2 points for infants separated less than three months, to 25 points for infants separated five months or more. Spitz further describes (1955, p. 107) the development of infants in a "very emotionally inadequate" foundling home. Despite excellent hygenic practices, 37 1/2% of the 91 children in the home died during a two year period. Of the 21 remaining in the home at age four years, profound retardation was observed in all but one. Five of the children were unable to walk; six had no speech; twelve could not feed themselves with a spoon; and six were not yet toilet-trained. Spitz attributed the lack of development principally to the lack of social interaction with others, and in particular to the lack of an identifiable, consistent mothering-figure.

Goldfarb (1943, 1947) concentrated his attention on the performance and personalities of adolescents who had been subjected to "cold, isolated, depriving experience during the first months of life" (1947, p. 456). He studied 30 children (14 girls, 16 boys) in their early teens who had been in institutions as infants but had lived in foster homes since about the age of three years. In his 1943 study he reported

finding IQ scores greatly depressed from test norms (difference of means 22.96 points, significant at .01 level) as determined by administration of the Wechsler-Bellevue Intelligence Test. Goldfarb's major emphasis, however, was on the examination of the children's abilities in forming emotional relationships; and the 1947 study was devoted entirely to these considerations.

Bowlby (1944), examining the early histories of juvenile delinquents, found a significantly higher incidence of early maternal deprivation among delinquents than among non-delinquents. Like Goldfarb, he confined his attention principally to emotional qualities, and agreed with Goldfarb that institutionalization produced much difficulty for the child in later affectional relationships. In a later study (1956), however, he conducted extensive research, including intelligence testing, on sixty children who had spent from one to more than twenty-four months in hospitals as tuberculosis patients during their first four years of life. The testing (with the Stanford-Binet Intelligence Test, 1937 edition, Form L) and follow-up study were administered when the children were about ten years of age. At that point, Bowlby reported that "...in the present investigation there was no evidence that level of IQ was related to length of deprivation..." (p. 213). Reporting a mean IQ score of 107 for these children, he said he could find no evidence of long-term damage to intellectual functioning from the institutional experience, but noted that this might be due to the fact that the subjects had not experienced such severe deprivation as had those in Goldfarb's study. Bowlby went on to dwell extensively on evidence of emotional damage of a more lasting nature, essentially

supporting Goldfarb's 1943 report.

Martin (1947) compared intelligence quotients of 148 institutionalized children in a dependent children's shelter with those of 74 children, of the same school grade, from private homes. Testing was done at the school which all the children attended, using the 1911 revision of the Binet-Simon Scale. The mean score found for institutionalized children was 73; for children in families, 89; probable error of difference of means, 0.7. No further tests of significance were applied.

Dennis, in his report on children in Iranian institutions (1960), observed general retardation of development in both social and motor behavior among infants in two publicly-supported institutions. In a third, privately-supported institution where more individual attention and handling was given, much less severe retardation was seen. Observations were made to determine whether or not the children were able to perform five basic motor tasks: sitting alone, creeping or scooting, standing with support, walking with support, and walking alone. In Institution I, of fifty children from 1.0 to 1.9 years of age, 42% could sit alone; 14% could creep or scoot; 4% could stand, holding; 2% could walk, holding; and none could walk alone. Of forty children in the same institution from 2.0 to 2.9 years of age, most could sit alone and creep or scoot; 45% could stand holding; 40% could walk holding; and 8% could walk alone. In Institution II, a facility for older children most of whose inmates came from Institution I, most of the observed thirty-three children aged 3.0 to 3.9 years were able to sit, creep or scoot, and stand and walk with assistance, but only

15% could walk alone. In Institution III, with increased attention and handling by staff, twenty children aged 1.0 to 1.9 years nearly matched the record of those two years older in Institution II; most could sit, creep, stand and walk holding, and 15% could walk alone. In the same institution, 31 children from 2.0 to 2.9 years of age were observed. All could sit, creep, stand and walk holding, and 94% could walk alone. No statistical analyses were applied to these findings. Dennis concludes that the extreme retardation in Institutions I and II was due to the lack of handling of the children by attendants, and particularly the absence of experience in infancy of being placed in sitting and prone positions.

In a later article Sayegh and Dennis (1965) suggested that this motor retardation was principally the result of the lack of applicable experiences among these infants, and that the apparent retardation could be reversed by exposing the infants to appropriate stimuli (this in opposition to Goldfarb's view that the damage from institutionalization was substantially irreversible).

Dennis offered no empirical testing of his hypothesis. But, Taylor (1968) published a description of her observations of thirty children who spent their first two and one-half years of life "under extreme conditions of maternal deprivation" in an orphanage, and who were later provided about one year of remedial institutional care involving consistent attention from stable mothering figures. The children were then placed in carefully selected and prepared foster homes. Like the earlier writers, Taylor concentrated primarily on emotional factors in her examination of the four children she chose as subjects for detailed

observation. She argued that emotional handicaps resulting from institutionalization can be overcome. She also reported Stanford-Binet (1960 Revision) scores for the four children at the time of the study, when they were five and six years of age; these scores were 102, 96, 107, and 88. Institutional records showed test scores for all but the first of these children from age three; these earlier scores were 80, 80, and 85 respectively. Disregarding the lack of change in the last case, Taylor states that "...the hypothesis that severe deprivation during the vulnerable period of six to 12+ months results in irreversible retardation cannot be supported by these three cases..." (1968, p. 843).

Baer (1967) administered Bender-Gestalt Tests (a check of eye-brain-hand coordination commonly used as an indicator of organic brain damage) and California Test of Mental Maturity (a group-administered intelligence test) to first graders within and outside of institutions (orphanages). IQs of 32 institutionalized children were significantly lower (difference of means 24.5 points, significant at .01 level). When IQ differences were statistically controlled by covariance analysis, no significant differences in Bender-Gestlat performance were found.

Bath (1967) administered Lorge Thorndike Intelligence Tests (group-administered) to all residents of a state school for dependent and neglected children. His subjects were 57 girls and 85 boys, of school grades 7 through 12. At all but two grade levels, subjects' test scores were significantly lower than test norms on the verbal scale (difference of means 1.97 to 18.14 points). Significantly lower scores on the nonverbal scale were found among the subjects in the eighth grade only. At all other grade levels the subjects' scores did not differ significantly from test norms for the nonverbal scale.

Kohen-Raz (1968) administered Bayley Mental and Motor Tests to infants (1 to 27 months old) in families (152 infants), in institutions (79 infants), and in kibbutzim (130 infants). Kibbutz and home children performed at the level of U.S. norms on motor scales, and higher than U.S. norms on mental scales. The children were divided into groups by age; at all age levels, kibbutz and home children showed higher mean scores than test norms (difference of means 1.3 to 7 points). Among kibbutz children, these differences were significant at the .01 level for three age groups (1, 6, 12 months). Among private home children, the differences were significant at the .01 level for four age levels (8, 10, 12, 15 months). Institutionalized infants performed below U.S. norms (difference of means 2.6 to 13.2 points), and significantly below the mean scores of noninstitutionalized Israeli children (difference of means 1.3 to 20.2 points; significant at .01 level at all age levels except 2, 7, and 10 months).

Silverstein (1969) explored the relationship between length of institutionalization ("hospital age") and tested intelligence, testing 204 institutionalized mental retardates (median age 12 years, 8 months). Two types of research design were used. The first was the standard cross-sectional form in which "each individual is tested just once, with different individuals represented at each point in time" (p. 125). Secondly, Silverstein used Zeaman and House's semi-longitudinal design, whereby "each individual is tested at least twice, but the same individual need not be represented at each point in time" (p. 125). Through integration, Silverstein derived separately from each set of data a formula describing the curve of decrease in

intelligence score according to hospital age. The curve found from the cross-sectional study was much more steep than that found from the semi-longitudinal study; the former indicated a loss of 15 IQ points over a period of 25 years; whereas the latter showed a loss of only 8 points in the same time. Silverstein attributes this difference possibly due to the tendency for higher-IQ inmates to be released from the hospital sooner. His study does indicate that among institutionalized mental retardates, IQ scores decrease with institutionalization, and that, the longer the period of institutionalization, the greater the decrease in IQ score.

Studies of Lower Animals

Research on the effects of early deprivation on later development - specifically on the issue of its irreversibility or reversibility - has been done with lower animals. Hunt (1961) offers a substantial review of this literature, which is only briefly summarized here. Hunt reports that research he examined indicated that severe early deprivation has definite and long-lasting effects on the development of animals. Studies mentioned here are those which deal specifically with the effects on intelligence or learning ability. Hebb (1949, p. 297), working with rats, found statistically significant differences in learning among two groups of rats, one group of which had been blinded in infancy and the other at thirty days of age. Hebb indicated that the loss of early visual experience produced a long-lasting decrement in ability in learning and adapting. Hymovitch (1952) experimented with rats reared in physically confining cages as compared with those reared in a free

environment, and found that differences in performance as adults related more to the amount of visual stimulation available, than to the amount of motor experience permitted. Forgays and Forgays (1952) disputed this conclusion, however, in similar experiments which seemed to demonstrate that motor experience was the major factor influencing later performance. Forgus (1955) found that animals given a generally-deprived infancy could outperform animals with an enriched early environment in tests which emphasized the cues available to the experience of the deprived infants. Thompson and Heron (1954) compared adult intelligence of dogs raised in homes as pets, with those reared in a laboratory under varying degrees of deprivation of experience with other animals and humans, before being placed in homes as pets. The dogs which had experienced early deprivation continued to show significantly worse performance on animal intelligence tests than the pet-reared dogs.

Several studies on the relation of early deprivation to later learning have been published since Hunt's review. Woods, Ruckelhaus, and Bowling (1960) raised 12 rats in a restricted environment (individual secluded cages, no handling) until 90-100 days of age, then compared their learning performance with that of 12 littermates raised for the same period in a free environment (large community cage). The rats were first tested in a Hebb-Williams maze. Restricted rats made significantly more errors ($p < .05$) than free-environment rats. Observations of exploratory behavior were also made, with the finding that restricted rats showed less exploratory behavior than free rats. At 215-225 days, the remaining rats (at this point three free rats and three restricted rats had died) were tested in a water maze (a "T" maze

in which the animal must swim to the correct arm in order to climb out of the water). No significant difference in performance between free and restricted rats was found.

Schweikert and Collins (1966) reared 21 rats in three groups of seven rats each, assigned to different rearing conditions. The "restricted" group was raised in a wire community cage with climbing prevented; the "maze" group was reared in a similar cage with a fiberboard maze six inches tall, open above to allow climbing; the "enriched" group was raised in a larger cage containing various objects to provide a variety of experiences. At 90 days of age, the rats were tested in a maze. "Maze" and "enriched" rats were significantly faster than "restricted" rats ($p < .01$ and $p < .005$, respectively). "Enriched" rats learned the maze with significantly fewer trials than the other two groups ($p < .005$), who did not differ significantly. "Enriched" rats made significantly fewer errors before learning the maze than did the other two groups ($p < .01$). "Restricted" rats made more errors than "maze" rats, but the difference was not significant ($.10 > p > .05$).

Krech, Rosenzweig, and Bennett published a series of articles (1962, 1964, 1966) reporting their experiments concerning the physiological effects of isolation, or enriched environments, on rats. They report finding

> "...consistent and significant differences in brain anatomy and chemistry between rats raised in groups in experientially enriched environments and their littermates raised in isolation in impoverished environments." (p. 99, 1966)

In the early experiments, rats were reared in either extreme impoverishment of experience in isolation (in small cages suspended in soundproof-

ing boxes) or in group cages with varied experiences of objects, training, etc. Isolated rats were found to have significantly less brain weight at maturity than rats raised in groups. In the 1966 experiment a further element was added; some rats were reared in pairs in the extremely impoverished cages. At 105 days of age, the rats were dissected. The rats from the enriched-experience cages showed significantly greater brain weight than those reared in impoverishment ($p < .001$), while there was no significant difference between the rats raised in impoverishment in isolation and those reared in pairs. It would appear, then, that in respect to physiological effects, impoverishment of experience rather than isolation is the main factor.

Melzack (1962) observed two puppies reared from three weeks of age to nine months of age in continually-lighted cages constructed to greatly restrict visual experience and contact with the outside environment. These dogs were then compared on several tests of learning with three littermates which had been reared as pets. The restricted dogs showed extreme excitement throughout the testing period. On the first test, on brightness discrimination, there was no significant difference in learning speed or accuracy between the two groups. On subsequent tests of black-white discrimination, and a reversal learning test, the restricted dogs made significantly more errors ($p < .05$ and $p < .02$, respectively). The final test given involved a discrimination between a horizontal and a vertical line pattern; at this point one of the non-restricted dogs displayed extremely excited behavior similar to that of the restricted dogs, and because of his high error score, no significant difference between groups was found.

Fuller (1966) compared the behavior of 16 beagle puppies which had been reared in isolation from age three weeks to age five weeks, with that of six puppies raised as pets. At 23-26 weeks of age, the puppies were observed in an arena for exploratory behavior. Subsequently they were tested with the Wisconsin General Test Apparatus on a simple reversal learning task. Pet reared animals made fewer errors overall ($p < .05$), but the differences were greatest on the first reversal series and decreased on subsequent series; on the last five series combined the difference was not significant ($p < .10$).

Fuller and Clark (1966) observed beagles and terriers reared in isolation, and reported decreased exploration, increased emotionality, and decreased social contacts upon emergence from isolation. They concluded that "...disturbed behavior /is/ a postemergence phenomenon rather than...an indication of perceptual deficiency induced by experiential deprivation in early life... Under especially favorable circumstances, forced contact with the handler, a suitable dose of chlorpromazine, and a robust genotype, the postisolation syndrome can be totally eliminated" (p. 256). No tests of intelligence or learning were administered.

Fuller (1967) did administer learning tests in a later experiment with dogs. Sixteen puppies, reared in isolation from 21 days to 105 days of age, were first observed for five weeks in arena tests of exploration and emotionality. They were then tested with the Wisconsin General Test Apparatus on a simple reversal test. Results were very similar to those in the 1966 study: on the first reversal series, pet-reared animals performed with significantly fewer errors than isolates

($p < .05$). On all other series, pets performed better than isolates, but not significantly so. Reported in the same article were two other experiments. In one, eight beagles reared in full isolation from four to fifteen weeks of age were compared in a test of visual discrimination with eight beagles reared in the laboratory as "semi-pets". Although the pets tended to do better, no significant difference in performance was noted. In the final experiment, beagles and terriers, all reared in isolation, were compared on a reversal learning test. All performed very poorly; some became phobic and were unable to complete the test series. However, no significant difference in performance by breed was found.

Harlow (1964, 1965), in several studies reporting observations of monkeys reared in isolation, reported profound and long-lasting damage to the monkeys' development of normal social behavior, describing "autistic" withdrawal, failure to develop normal interaction with other monkeys, and frequent failure of mating and maternal behavior. However, he reported that learning tests when administered showed no loss of normal learning abilities.

Griffin and Harlow (1966) compared monkeys which had experienced visual and auditory, but no physical, contact with other monkeys; to total isolates. As in Harlow's earlier studies, severe differences in behavior relating to social and emotional development were noted, but no significant differences in learning abilities were found.

Summary

A number of studies of the effects of institutionalization on child development have been reported in the literature. Spitz (in his

1955 article) and Dennis both made observations of the development of infants in what they described as severely depriving institutions, and both reported profound retardation of development, although no intelligence tests were given. Kohen-Raz studied infants in Israeli institutions as compared with those in homes and kibbutzim, and also reported retarded development among institutionalized infants. Martin, Baer, and Bath, comparing American children in institutions with noninstitutionalized peers, found lower IQ scores among the institutionalized subjects. All of these studies, then, support the hypothesis that the institutional experience produced children who failed to develop intellectual abilities at a normal rate.

Taylor explored the issue of the possible reversal of such effects through intensive rehabilitative efforts subsequent to the institutional experience, and reported that such efforts were apparently successful, and the children did attain normal intellectual development.

Bowlby (1956) and Goldfarb (1943) offer contradictory reports on the issue of possible spontaneous recovery from the effects of institutionalization. In Goldfarb's sample of adolescents who had been institutionalized as infants and then placed in foster homes without rehabilitative treatment, IQ scores in the early teens were still significantly lower than test norms. On the other hand, Bowlby reported no lowering of IQ scores of ten-year olds who had been institutionalized for varying periods of time during their first four years of life. Bowlby pointed out, however, that the institutional experiences of his subjects had not involved such severe deprivation as had been the case with Goldfarb's sample.

Bowlby also considered the issue of the correlation between the length of institutionalization and later tested IQ, and reported that he found no relationship. As he had no figures for the children's IQs at the time of the institutional experience, however, this speaks only to the issue of the longevity (or lack of it) of any effects which may or may not have been present.

In Spitz' 1948 study, observations of infants' developmental progress at the time of institutionalization were made. Spitz reported that infants' development was more retarded, the longer they had been in the institution. No IQ measures were applied.

Silverstein's study of institutionalized mental retardates is the only study in which the issue of the possible relationship of length of institutionalization and intellectual development was studied by IQ measures applied at the time of institutionalization. Silverstein reports that for mental retardates, IQ scores decrease with institutionalization, and that the longer the period of institutionalization, the greater the decrease in IQ score. It should be recognized that this finding can be applied only with caution to non-retardates. Since the IQ score represents a (modified) quotient of mental to chronological age, and since many retardates evidence a disruption of rate of development, some lowering of IQ score over a period of time could be expected with retardates in general, regardless of treatment mode.

In virtually all of the above studies, the authors have indicated that the observed lack of intellectual development in institutionalized children was due, in their judgement, to the lack of close, personalized emotional contact with parental figures. The single exception is

the Sayegh and Dennis article, in which they express the hypothesis that lack of motor experience of the appropriate sort could account for the lack of development which they observed. They offered no testing of this hypothesis, and such testing among human subjects would be difficult to provide at this time, as institutions for human children are, now, rarely so exceedingly depriving as those Dennis originally observed.

Assuming that there may be a parallel between reactions of human beings to institutionalization, and reactions of lower animals to various types of deprivation of experience, we may draw some further information from studies done with lower animals. Although it is not sound to attempt to draw conclusions about one species from experiments with another, meaningful indications for future observations of human subjects can be drawn from animal studies.

Experiments with rats have generally involved rearing the rats in a very restricting environment and studying subsequent learning ability. Thus, Hebb restricted visual experience by blinding the rats either at birth or at thirty days of age; Hymovitch, Forgays and Forgays, and Schweikert and Collins raised rats in cages offering little object or climbing experience. All reported reduced learning speed or accuracy in restricted rats, as compared with rats reared in normal or enriched environments, although the issue of whether visual or motor stimulation was most crucial remained in question.

Forgus' study indicated that the loss of learning ability was not complete; rats reared in a generally deprived environment, but with some visual cues available, out-performed nonrestricted rats on tests

involving the cues which they had experienced.

Woods reared rats in a restricted environment which included social isolation; these restricted rats showed lower learning ability than nonrestricted rats. Krech, et al., examined the physiological effects of early deprivation: brain weight of adult rats which had been reared in deprived or isolated circumstances was less than that of rats reared normally, in laboratory cages. Rats reared in pairs in cages designed to deprive them of virtually all outside stimulation showed no significant differences from those reared in complete isolation in such cages; thus it appeared that, in rats, impoverishment of experience was a more crucial factor than isolation.

Experimenters using dogs as subjects have carried out studies comparing pet-reared with laboratory-reared animals which also have indicated a decrement in learning following deprivation. Thompson and Heron compared pet-reared dogs with littermates reared under normal laboratory conditions; Melzack, and Fuller, reared the laboratory animals in isolation. All reported some lower performance scores for deprived animals, although Melzack and Fuller indicated that these differences were greatest on the first reversal learning test, and that the differences between the two groups were less thereafter, and less on different types of learning tests.

Studies of the effects of deprivation on development of monkeys have provided information which differs somewhat from that obtained in studies of other lower animals. In Harlow's studies of monkeys reared in isolation, and also in Griffin and Harlow's studies comparing monkeys reared in total isolation with those only partially isolated,

profound changes in development of social, mating, and maternal behavior are reported. In these studies, however, no evidence of change in rate or accuracy of learning, and no change in intelligence, was noted among isolated monkeys.

Studies of lower animals have indicated that deprivation of experience, and isolation, have definite effects on animal development. Experiments with dogs and with rats indicated that learning was poorer among deprived subjects; in the studies of monkeys, however, there was no evidence of any decrement in normal learning ability, although social behavior was definitely effected by isolation. Although the element of isolation may be separated to a degree from that of deprivation (and in the study by Krech et al. of physiological effects in rats, there was indication that deprivation was a more important factor), there really can be little question that monkeys reared in isolation also suffered deprivation of normal experiences. It is therefore difficult to reconcile the findings of the Harlow studies of monkeys with those on other lower animals, except by speculating that the particular types of measures of learning ability may have effected the outcome. Disregarding these studies of monkeys, the main portion of the studies done on lower animals does support the hypothesis that deprivation of experience has a negative effect on development of learning skills and intelligence.

Studies of human beings done at the time of institutionalization have indicated that the institutional experience does produce a decrement in intellectual development. Contradictory evidence exists regarding the reversibility or irreversibility of such effects, but there seems

to be some indication that rehabilitative treatment can reverse the effects. The issue of the effect of length of institutionalization on teh severity of the results has been raised, but not fully explored. The only study involving IQ scores from tests at the time of institutionalization, compared with the length of time the subject had been institutionalized, was Silverstein's study of mental retardates. This question had not been examined with regard to children in institutions for reasons other than retardation.

The present study is addressed to the question of whether a decline in learning and intelligence does occur in institutionalized dependent and neglected children as a function of the length of time institutionalized.

METHOD

Subjects

The subjects of the present study were thirty-four dependent children residing in the County receiving home in San Joaquin County, California. The children (22 boys, 12 girls) ranged in age from three years, zero months; to eleven years, nine months (mean seven years, 1 month). Their days-institutionalized when tested ranged from two to 395 days; mean 136 days, standard deviation 118 (see Table 1).

The children had been placed in the shelter because they were believed to be children defined by California law to be dependent children: that is, children who "have no parent or guardian actually exercising proper parental care" (Section 600a, California Welfare and Institutions Code) or "whose home is an unfit place for them by reason

of neglect or depravity on the part of their parents" (Section 600b) or "who suffer from a mental or physical abnormality which causes them to be a threat to society" (Section 600c; a category rarely used in San Joaquin County; during the interval in which this study was conducted, there were no children in the home under this section of the law). In short, the children had been removed from their family homes because they were judged to have been either neglected or mistreated there, or because their families were unable to care for them.

Their placement in the receiving home, Mary Graham Hall, presented them with a very impersonal environment. The administrators viewed the Hall as a temporary detaining center, and consequently they viewed the obligations of the shelter as primarily physical: to provide clothing, shelter, food, and necessary medical care for children until they could be moved elsewhere. In fact, however, children often did remain in the shelter for several months, and for periods of a year or more on occasion. It was the author's observation that during the time of the study no concentrated effort was made to provide personalized care and attention, or to systematically deal with whatever anxiety the children might have had about their situation.

Equipment

The principal test used in this study was the Stanford-Binet Intelligence Scale, Form L-M, 1960 Revision. This scale is an individually-administered test of intelligence which yields mental age and deviation IQ scores. Tests are grouped at age levels from (mental

Table 1

Sex, Age and Days-Institutionalized of Each Subject

Subject Number	Sex	Chronological Age (years-months)	Days in Institution
01	M	3-0	346
02	M	3-3	306
03	M	3-3	306
04	M	3-7	395
05	M	3-7	23
06	M	3-11	155
07	F	4-3	2
08	F	4-5	129
09	M	4-9	128
10	F	4-10	178
11	M	4-11	388
12	M	5-4	151
13	M	5-8	224
14	F	6-1	14
15	M	6-6	132
16	F	6-6	212
17	M	6-8	105
18	M	6-11	30
19	M	7-4	315
20	F	7-4	133
21	F	7-7	2
22	F	9-0	30
23	F	9-1	48
24	M	9-1	30
25	M	9-1	131
26	M	9-4	5
27	M	9-7	324
28	M	10-3	54
29	F	10-4	48
30	F	10-6	12
31	F	10-7	94
32	M	10-8	45
33	M	11-1	71
34	M	11-9	42

age) II to Superior Adult, with half-year intervals between levels II to V, and year intervals thereafter. Test items tap abilities in simple manipulation (at the lowest levels), vocabulary, comprehension, spatial orientation, abstract reasoning, and verbal ability, among others. (See Appendix I.)

The Cattell Infant Intelligence Scale was also used in the present study to provide a downward extension of the Stanford-Binet in the case of children unable to establish a basal mental age at the lowest level of the Stanford-Binet. The Cattell test was developed for this purpose. It gives age levels from 2 to 30 months. (See Appendix I.)

Procedure

The testing was done in the shelter in a small, office-like room generally used for visiting, for brief informal hearings, and the like. Test time ranged from 15 to 60 minutes, with a mean of 40 minutes. Two of the tests were administered in two sessions several hours apart because the subjects (#10 and #26) were hyperactive, and the length of time involved in a continuous testing evidently exceeded their attention span.

The tests were administered on eleven different days between November, 1968, and July, 1969. During this time 56 children in the age range chosen for the study (3 to 12 years) entered and left the shelter without being tested. Their stays in the shelter ranged in length from 1 to 128 days, with a mean stay of 24 days. Nearly half of these children (27 of them) remained in the shelter for one week or less.

The subjects were chosen from the children in the age group under study who were present in the shelter and available at the time testing was being done. The subjects were chosen without any selection plan, except that an effort was made to obtain a balance in the number of children tested at various age levels.

Research Design

A negative correlation between the length of time the child had been institutionalized and the tested IQ score was predicted. The measure of relationship used was the Pearson product moment correlation coefficient. Both IQ scores and days-institutionalized may be considered to be measures using an interval scale, and therefore suitable for the Pearson coefficient.

The correlation between subjects' IQ score, and days-institutionalized was calculated. To check the possibility of other contaminating factors existing, correlations were also calculated for chronological age and days-institutionalized, and for IQ score and age.

RESULTS AND DISCUSSION

Test scores for the subjects ranged from 51 to 136, with a mean of 84.4 and a standard deviation of 18.9. The test norm is 100; application of "t" test indicates that this is a significant deviation from the norm (difference of means = 15.6, $t = 4.74$, $p < .002$, $df = 33$). Table 2 shows the IQ scores and subjects' ages in order of the subjects' days-institutionalized at the time of testing.

The correlation between days-institutionalized and IQ scores was in the predicted direction, but was not of significant magnitude ($r = -.28$, $t = 1.65$, $p < .10$, $df = 32$). A negative correlation was

Table 2

IQ Scores, Days-Institutionalized,

and Age of Subjects

Days Institutionalized	IQ Score	Chronological Age (years-months)
395	70	3-7
388	77	4-11
346	74	3-0
324	65	9-7
315	74	7-4
306	51	3-3
306	51	3-3
224	85	5-8
212	96	6-6
178	114	4-10
155	119	3-11
151	136	5-4
133	76	7-4
132	94	6-6
131	89	9-1
129	74	4-5
128	90	4-9
105	94	6-8
94	98	10-7
71	63	11-1
54	83	10-3
48	79	9-1
48	60	10-4
45	95	10-8
42	59	11-9
30	106	9-0
30	95	6-11
30	73	9-1
23	109	3-7
14	87	6-1
12	70	10-6
5	90	9-4
2	93	4-3
2	81	7-7

also found between IQ scores and age, but this correlation also was not significant ($r = -.17$, $t = .977$, $.10 > p > .05$, $df = 32$). A significant negative correlation was found between age and days-institutionalized ($r = -.51$, $t = 3.36$, $p < .005$, $df = 32$).

A partial correlation was computed for the relationship between days institutionalized and IQ score with the effect of age eliminated. This partial correlation was significant ($r_{12.3} = -.43$, $t = 2.69$, $p < .01$, $df = 32$).

Discussion

The study examined the hypothesis that a negative correlation exists between IQ scores and the length of time a child has been institutionalized; that is, that a decrease in rate of maturation of abilities measured by the test begins early in the institutionalization experience and continues as long as institutionalization continues. The results provide some support for this hypothesis. The observed correlation between IQ score and days-institutionalized was in the predicted direction, but was not significant. However, when the effect of age was statistically removed by the partial correlation technique, a significant negative correlation between days-institutionalized and IQ score was found.

A result not predicted by the hypothesis was the significant negative correlation between age of subject and days-institutionalized (i.e., in this sample, older children had been in the institution significantly less time than had younger children). It is the author's belief that, since children usually leave the institution either to be returned home or to be placed in a foster home, this difference

could be due to extra caution taken in placing a small child. That is, whereas an older child may be assumed capable of protecting himself or seeking help if problems arise, and may therefore be placed in a questionable home, a smaller child is often held in the institution until a more nearly perfect situation can be found. (This explanation is, of course, speculatory in nature.)

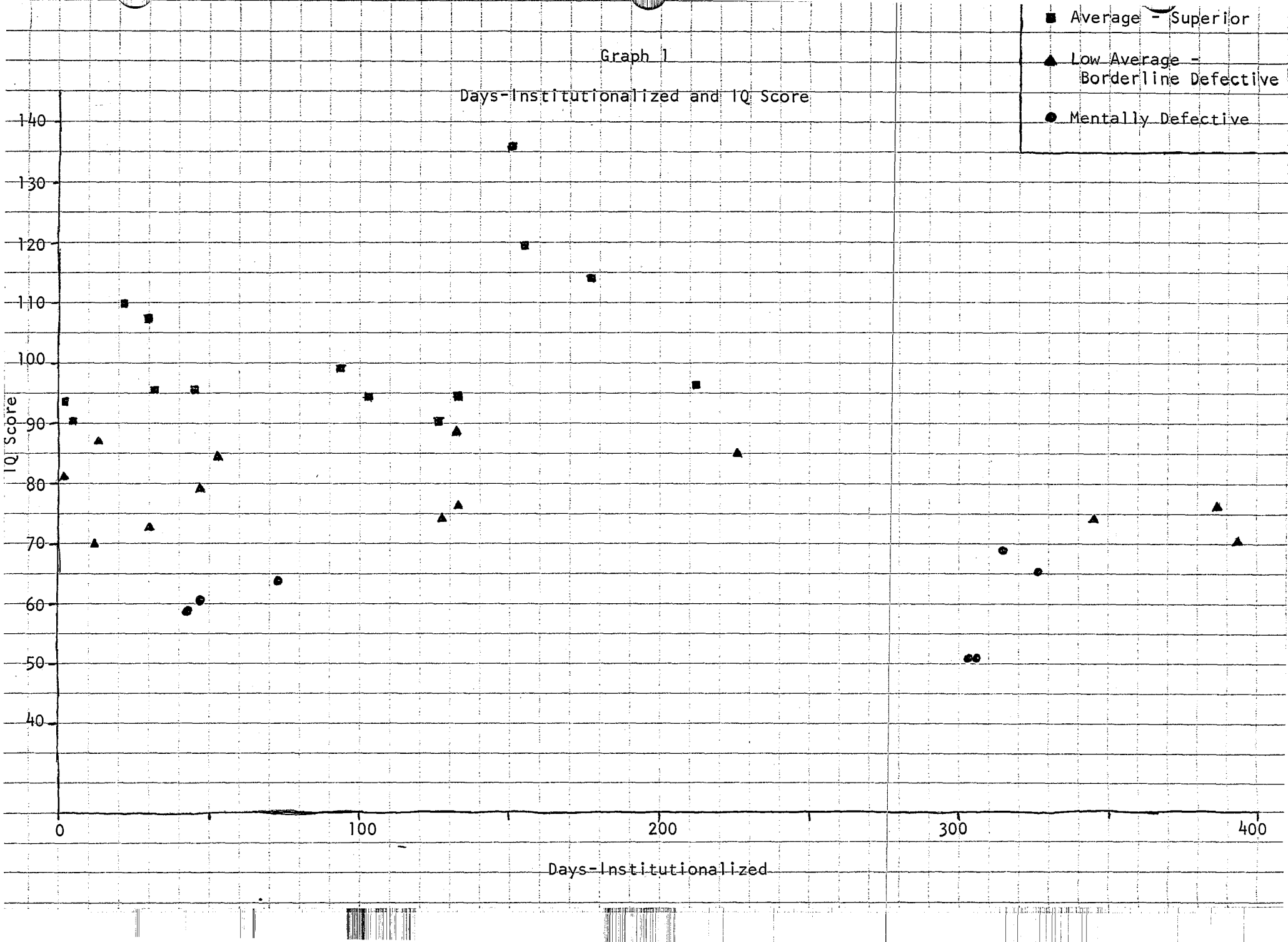
In considering the results of this study, it should be borne in mind that there was a considerable range of values for both IQ score (range 51 to 136) and days-institutionalized (range 2 to 395 days) among the relatively small sample of thirty-four children. This distribution is graphically represented in Graph 1. A repetition of the study with a larger sample (which might be readily possible in an institution where intelligence testing was a routine part of institution practice) could provide further testing of the hypothesis.

SUMMARY

Examination of the tested intelligence of 34 institutionalized children in a public shelter shows significantly lower IQ scores than the test norms. Correlation of test scores with the number of days the subject had been in the institution showed a negative correlation, but not of significant magnitude. However, when the effect of chronological age was statistically controlled, a significant negative correlation was found, thus supporting the hypothesis that during the institutionalization experience of the child a decrease in the rate of maturation of skills measured by IQ tests occurs. An unpredicted negative correlation between age and days-institutionalized was noted; the author speculated that it might have been due to differences in placement practices for older children as compared to younger ones.

Graph 1

Days-Institutionalized and IQ Score



APPENDICES

Appendix A

Reliability and Validity Data on Stanford-Binet Intelligence Scale

Reliability of the 1937 Stanford-Binet, from which the 1960 revision was drawn, was tested through administration of the two forms, L and M, less than a week apart. At ages 2 1/2 to 5 1/2, the reliability coefficients ranged from 183 (for IQs 140-149) to .91 (for IQs 140-149) to .97 (for IQs 60-69). In general, the scale was found to be more highly reliable for older than younger children, and more highly reliable for lower than for higher IQs. (Terman, 1960)

Reliability data on the 1960 revision is drawn from the biserial correlation of each subtest of the L and M forms with the total score. The retention of subtests in the 1960 revision was based in part on the strength of such correlations. Terman notes that "The mean correlation for the 1960 scale is .66 as compared with a mean of .61 for all tests in both Forms in the 1937 revision." (p. 11).

Estes, Gurtin, DeBurger, and Denny (1961) examined the validity of the test through correlations between IQ scores from the 1960 Stanford-Binet and scores from four other tests: the 1937 Stanford-Binet; Wechsler Intelligence Scale for Children; Raven; and Draw-A-Man. Eighty-two subjects (grades 1 - 8; 47 boys, 35 girls) were tested, on each of the four tests. All the children tested showed average or above-average scores, so no information on below average scores could be deduced. Among subjects scoring in the average range, there were

no significant differences in scores on the various tests. Among subjects showing above-average scores, significantly higher scores were found on the Stanford-Binet than on WISC (difference of means 7.5 points, $p < .002$, $df = 82$). Among subjects scoring Very Superior, the 1960 revision showed significantly higher scores than the 1937 revision (difference of means 8 points, $p < .002$, $df=82$).

In a later study, Estes (1965) compared scores on the 1960 Stanford-Binet, WISC, and Otis Quick-Scoring Mental Abilities Tests, of 102 subjects (51 boys, 51 girls; grades 4 - 10). Eighty-five subjects were given both WISC and the 1960 Stanford-Binet; the Pearson product-moment correlation of scores was .76. A similar correlation study on scores of the 98 subjects who took both Stanford-Binet and Otis tests yielded a correlation of .63.

Bond (1940), using the 1937 revision, found correlations of from .43 to .73 between Stanford-Binet performance and performance in various academic subjects among high school students. The higher correlations were in more verbal courses such as English, reading, and history. No validity studies based on academic performance and 1960 revision scores have been reported in the literature; however, as the items are all drawn from the 1937 revision, presumably the validity of the test remains much the same.

Appendix B

Reliability Data on Cattell Infant Intelligence Scale

The Cattell scale was developed as a downward extension of the 1937 revision of the Stanford-Binet, and gives age levels from 2 to 30 months. The author of the Cattell Scale tested its reliability in a test-retest study of 609 infants at seven age levels from 3 to 30 months, finding reliability coefficients ranging from .56 to .90. The lowest reliability was at the 3-month level. (Cattell, 1947).

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